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AN OPENING SYSTEM FOR SEALED PACKAGES, A PROCESS AND DEVICE FOR ITS MANUFACTURE

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The present invention has as an object a system permitting a sealed package to be opened easily without affecting its contents. The invention also covers the process and device for manufacturing this system.

The system according to this invention consists of making a slit or hole between the lower edge of the weld and the upper edge of the package. In the case of a hole, the side of the hole forming an acute angle is directed toward the contents of the package.

The heat-sealed packages used in wrapping foods or other goods are so easy to break open without a cutting instrument that they may tear during handling, storage, or shipping or, on the contrary, so strong that it is difficult to open them without a cutting instrument. However, it is more convenient to be able to open these

packages with the finger pressure alone. Making a slit from the upper edge of the package to the weld has recently been proposed to resolve this difficulty.

This process has the following disadvantages: On the one hand, the package may be torn accidentally during handling, storage, or shipping. On the other hand, during the large-scale production of packages, the slit of one package has a tendency to damage the edge of the following package.

This invention has the object of making available a system which permits packages of a heat-sealed flexible material to be opened by finger pressure, with no cutting instrument, without risk of accidental opening during handling, storage, and shipment of the packages, without injury to the packages during manufacture, and in such a way that the packages will regularly open along the intended line.

A further object of the invention is to make available a device which permits the packages mass-produced by the system of this invention to be treated as they pass along the manufacturing line without damaging the bottom of the following package. The device of this invention is easy to operate and leads to excellent results.

The invention has as a further object a manufacturing process permitting the formation of the opening system and the heat sealing to be carried out simultaneously or separately during the package-manufacturing process.

The invention will be better understood by reading the following detailed description and examining the attached drawings, which show several non-limiting examples of the implementation of this invention.

Figure 1 is a plane view of a mode of implementation of the invention in which the sealed package has a slit in its sealed portion.

Figure 2 is another version of the mode of implementation of Figure 1 in which the package has a hole with an acute angle cut in its sealed portion.

Figure 3 is a plane view of a second mode of implementation of the invention in which the sealed package has a slit which does not reach either the lower edge of the sealed portion or the upper edge of the package.

Figure 4 is a variation of Figure 3 in which the opening system is a hole with an acute angle.

Figure 5 is a plane view of a third mode of implementation of the invention in which the sealed package has a slit outside the sealed portion which extends to neither the upper edge of the sealed portion nor the upper edge of the package.

Figure 6 is a variation of Figure 3 in which the opening system is a hole with the acute angle directed toward the sealed portion of the package.

Figure 7 is a plane view of a fourth mode of implementation of the invention in which the sealed package has a hole made in an area surrounded by a supplementary sealing line connected to the principal sealed portion.

Figure 8 is a plane view of a fifth mode of implementation of the invention in which the sealed package has a hole at an acute angle in a zone surrounded by a supplementary sealing line.

Figure 9 is a plane view of a sixth mode of implementation of the invention in which the sealed package has a slit outside the sealed portion and directed toward an incurved portion of this sealed area.

Figure 10 is a plane view of a seventh mode of implementation of the invention in which the sealed package has a slit made in a zone surrounded by an annular portion of the sealed part of the package.

Figure 11 is a side elevation of a device permitting the heat-sealing of a package and the simultaneous cutting of a slit or hole according to this invention.

Figure 12 is a vertical cross-section of the device of Figure 11.

Figure 13 is a plane view below the heating device used in the device of Figure 11.

Figure 14 is a front view of the housing of the heating device of Figure 13.

Figure 15 is a perspective view of the principal part of an automatic device permitting separate heat-sealing, slit cutting, and sectioning of the packages.

Figure 16 is a view of the lower part of a device having both a heat-sealing device and an immovable cutting tool.

Figure 17 is a cross-sectional view of the principal part of the device of Figure 16.

Figure 18 is a plane view of the principal cutting device of a supplementary heat-sealing device independent of the principal heat-sealing device.

Figure 19 is a plane view of a device permitting heat-sealing and the cutting of a slit to be carried out separately.

Figures 20, 21, and 22 are cross-sections along line A-A of Figure 19. Figure 20 shows the device in the pre-operation position. Figure 21 shows it during the heat-sealing operation, and Figure 22 shows it during the slit-cutting operation.

Figures 23, 24, and 25 are cross-sections along line B-B of Figure 19. Figure 23 shows the device in a pre-operation position, Figure 24 shows it during the heat-sealing operation, and Figure 25 shows it during the slit-cutting operation.

Figure 1 shows polyethylene package 1 of which the upper part (3) is heat-sealed. Slit 5 made in upper part 3 reaches neither upper edge 2 nor the lower edge of sealed portion 3.

In Figure 2, which shows a polyethylene-coated cellophane package heat-sealed at 3, the slit is replaced by hole 5 of which one side (6), forming an acute angle, is directed toward the inside (4) and one side (6'), forming an obtuse angle, is directed toward the upper edge of the package.

In Figure 3, the heat-sealed portion forms a band 3 under upper edge 2 of the package. Slit 5 goes from upper part 7 to sealed portion 3 without reaching the interior (4) or the edge (2).

As a variation of Figure 3, Figure 4 shows a hole identical to that of Figure 2.

In Figure 5, a sealed package like that of Figure 1 has a slit in the upper part (7). This slit reaches neither upper edge 2 nor sealed portion 3 of the package.

As an alternative, it is also possible to include a loop *b* toward which slit 5 is directed, as shown in Figures 7 to 10.

In these modes of implementation of the invention, the package is opened manually along fictive line *x* which extends from the slit or hole.

Figure 6, a variation of Figure 5, shows a hole (5) of the same shape and direction as that of Figure 2.

In Figure 7, the package has a principal heat-sealed section 3 along its upper edge 2. A supplementary sealed section *b* connects with it. In Figure 8, the supplementary sealed section is independent of the principal sealed section. In Figure 10, this supplementary sealed section is formed within the principal sealed section.

In these three figures, it is seen that an isolated portion (*c*) is formed. This portion contains a slit or hole (5) with an acute angle directed toward incurved portion *b* of the supplementary sealed section.

A package which includes the system of this invention is not in danger of being opened accidentally during handling, storage, or shipping, since the slit or hole does not reach its upper edge. It can easily be opened with no cutting instrument by means of finger pressure over slit or hole 5. Because the package is air- and water-tight, there is no risk that its contents will be altered by contact with microorganisms coming from the outside environment.

In addition, the modes of implementing the invention shown in Figures 7 to 10 permit the packages to be opened in a given direction

x fixed by the direction of the slit or hole and by the shape of loop b surrounding said slit or hole.

Furthermore, experience shows that the package will generally open under finger pressure in the direction of the acute angle of the hole and not in the direction of the obtuse angle. As the hole is made in such a way that the edge which forms the acute angle is directed toward the interior of the package, it is therefore possible to reduce the size of the upper part of the package which acts as a guard above the hole, since there is no risk of accidental tearing toward the top. This leads to a savings in material.

A device which permits simultaneous heat-sealing and cutting of a slit or hole according to this invention is shown in Figures 11 and 12. This device includes heating unit 11, heated electrically by element 12 which receives its electrical power through terminals 18 and 19. The lower part of unit 11 has projecting part 13 on one side for primary sealing, projecting part 14 on the other side for supplementary sealing, and heated cutting knife 15 in the middle. Knife 15, of a width less than or equal to that of part 13, extends further down than parts 13 and 14. Parts 13 and 14 are connected by collar 16. Unit 11 is held by screws 17. Support housing 20 is filled with elastic substance 21 covered by rubber (specifically, silicone rubber) plates 22 and 23. Metal wedges 21 (not shown) are placed on both sides and in the center of support 20 to support the compression forces. When two superimposed polyethylene sheets 25 pass over support housing 20, heating unit 11 is lowered such that parts 13, 14, and 16 press sheets 25 against support 20. Projecting parts 13 and 14 heat-seal sheets 25 while heated knife 15 cuts slit or hole 5.

In the mode of implementation shown in Figure 15, very thin polyethylene tube 1 is intermittently moved toward a device according to this invention on which it can be fixed immovably.

The device is composed of heat-sealing device D consisting of heating element 26 for the primary seal (3) and heating element 27

for the supplementary seal (C), as well as cutting device E which consists of heat-cutting element 28 for the main body of the package (1) and knife 29 for cutting slit 5 in the space delimited by supplementary seal C. This makes it possible to seal the packages, cut them apart, and cut the slits in succession, which permits excellent results to be obtained in large-scale manufacturing.

In the device shown in Figures 16 and 17, an oblique groove is made over a large portion (*g*) of heating unit 30. Knife 31, which projects beyond the surface of unit 30, is fixed immovably in this groove in such a way that the slit is cut and the package is heat-sealed simultaneously.

As an alternative, the position of the knife can be changed according to the position and direction to be imparted to the slit. In addition, the knife can be changed depending on the heat-sealing and cutting conditions.

In the device of Figure 18, heating unit for the principal seal 32 is fixed to a frame composed of parts 33 and 34. Auxiliary sealing device 35 is fixed to the side of part 34 and carries knife 36 which may or may not be heated.

This arrangement permits packages to be heat-sealed and the slits or holes to be cut simultaneously by pressing heating assembly 32 and 35 and knife 36 against the polyethylene sheets.

The device shown in Figures 19 to 25 has two sealing jaws *m* and *n* which face each other. Between lower jaw *n* and plate *r* which carries this jaw, there is a space *S* which is determined by the movement of spring *t*. Knife *p* is fixed to table *r*, and is independent of jaw *n*. Package 1 is placed between jaws *m* and *n* and the top jaw is lowered. This results in a seal like the one shown in Figure 10. Jaw *m* continues to descend, compressing spring *t*, and package 1 descends, held by jaws *m* and *n*. Knife *p*, fixed to table *r*, then cuts slit 5 in the auxiliary seal *b* through space *o*. For proper cutting, distance *S* is adjusted until it is approximately equal to the distance between the top of knife *p* and the upper face of jaw *n*.

Once it is all the way down, jaw *m* is pushed back by the expansion of spring *t*. Knife *p* is first detached from object 1. Jaw *m* continues to rise and is in turn detached from the object. Thus the slit is cut and the package is sealed in two stages. This method permits the knife to separate properly from the object in the case of polyethylene-coated cellophane and is highly adaptable to large-scale production.

In this example, a slit (or hole) can be obtained by heating knife *p* to a temperature higher than the melting point of the material with which it is placed in contact. This results in perfect cutting regardless of the material used.

The opening system of this invention is suitable for sealable packages obtained from a sheet, film, or tube of plastic or a material impregnated or coated with plastic. This system permits said packages to be opened by simple finger pressure, without the aid of cutting instruments and without risk of accidental opening after filling, during handling, storage, or shipping. As the slit or hole does not reach the upper edge of the package, there is no risk of damaging the following package, not yet sealed, on its passage through the production line. Thus such a system is highly suitable for large-scale production.

Thanks to the processes and manufacturing devices which have just been described, it is easy to obtain an opening system according to this invention, which thus contributes to increasing use of this type of packaging among consumers and producers.

The term "sealing" used in the present invention extends to all adhesive means, particularly chemical products or high-frequency sealing.

It should be understood that the invention is in no way limited to the examples described and shown. It is capable of being modified in many ways accessible to the technical specialist, depending on the application being considered and without exceeding the scope of the invention.

SUMMARY

The invention has as its object:

1. A system for opening sealed packages which consists of a slit between the upper edge of the package and the lower edge of the sealed portion, said slit being directed toward the contents of the package.

2. A mode of implementation of the opening system defined under 1 in which the slit is replaced by a hole of which the edge forming an acute angle and the edge forming an obtuse angle are directed toward the contents of the package and the upper edge of the package, respectively.

3. Another mode of implementation of the opening system defined under 1 or 2 in which the slit or hole is cut in an auxiliary sealed section, connected to the principal seal or separate from it.

4. Another mode of implementation of the opening system defined under 1 or 2 in which the sealed section has a loop toward which the slit or hole is directed.

5. A mode of implementation of the opening system defined under 1 or 2 in which the slit or hole is given an arbitrary position and an arbitrary direction.

6. A process for manufacturing an opening system according to any of the preceding paragraphs which permits the package to be sealed, the slit to be cut, and the package to be cut simultaneously.

7. A mode of implementation of the process defined under 6 in which the sealing and cutting operations are performed separately.

8. Another mode of implementqtion of the process defined under 6 in which the heat-sealing is carried out between an upper and a lower jaw which face one another. A space the size of which is determined by a spring is provided between the lower jaw and the support plate. The heat-cutting is accomplished by a knife brought to a suitable temperature and fixed to said plate independently of the jaw attached to said spring.

9. As a new industrial product, any package having an opening system manufactured by a process having at least one of the characteristics described in paragraphs 6 to 8 of the present summary.

10. The new industrial product constituted by any package having an opening system showing one of the characteristics described in paragraphs 1 to 5 of the present summary.

Heihachiro Yamamoto
Represented by:
Cabinet S. Guerbilsky

Fig. 1

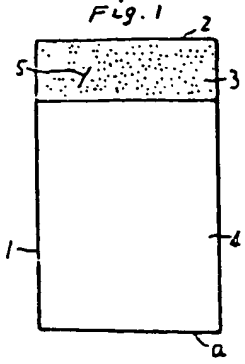


Fig. 3

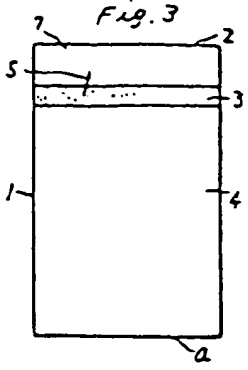


Fig. 5

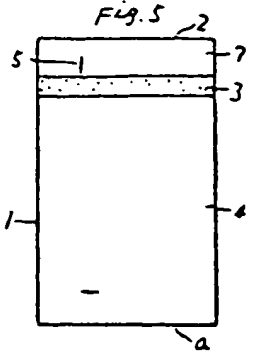


Fig. 2

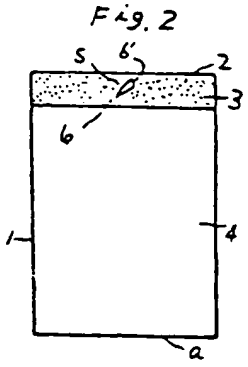


Fig. 4

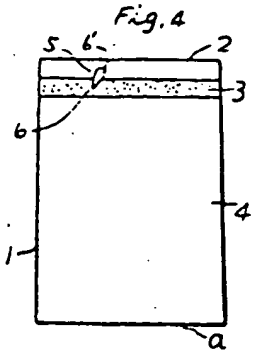


Fig. 6

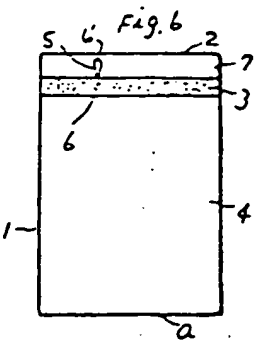


Fig. 7

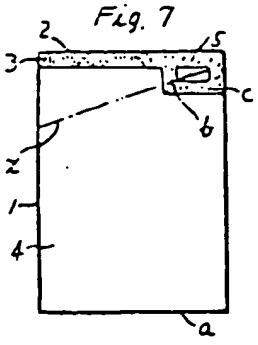


Fig. 9

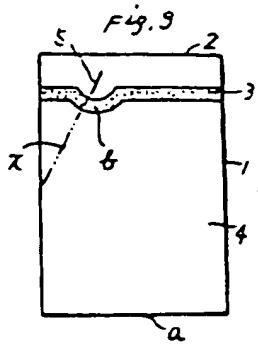


Fig. 10

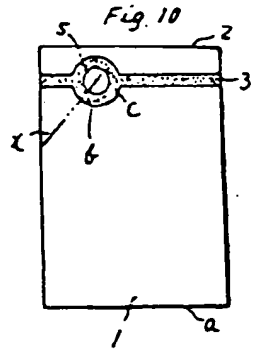


Fig. 8

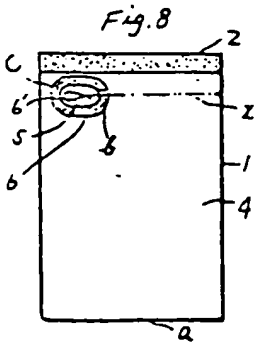


Fig. 11

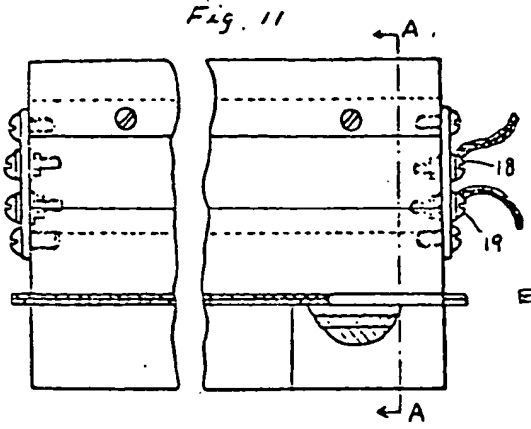


Fig. 12

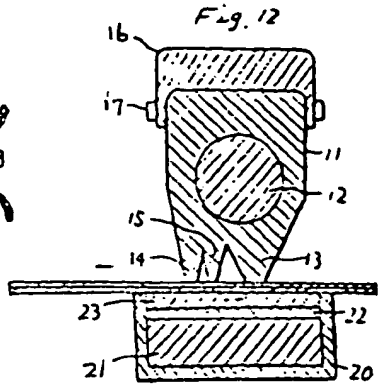


Fig. 14

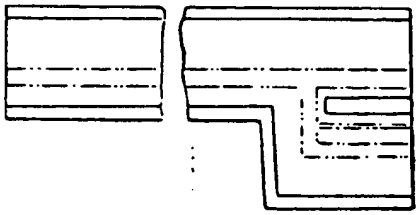


Fig. 13

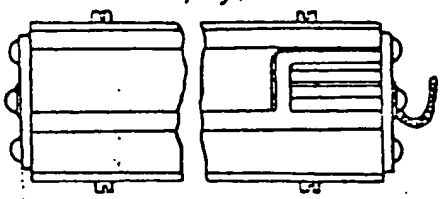
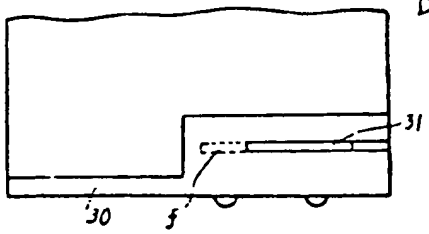
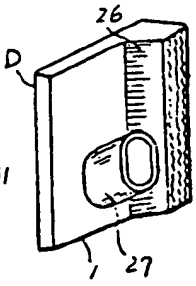


Fig 16





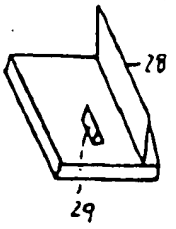


Fig. 15

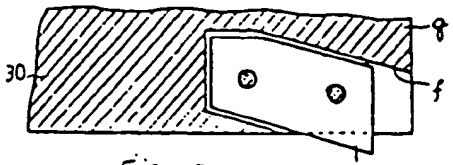


Fig. 17

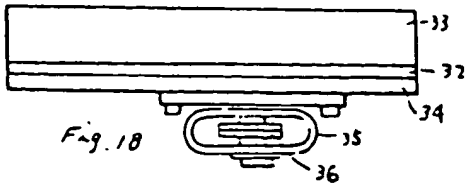
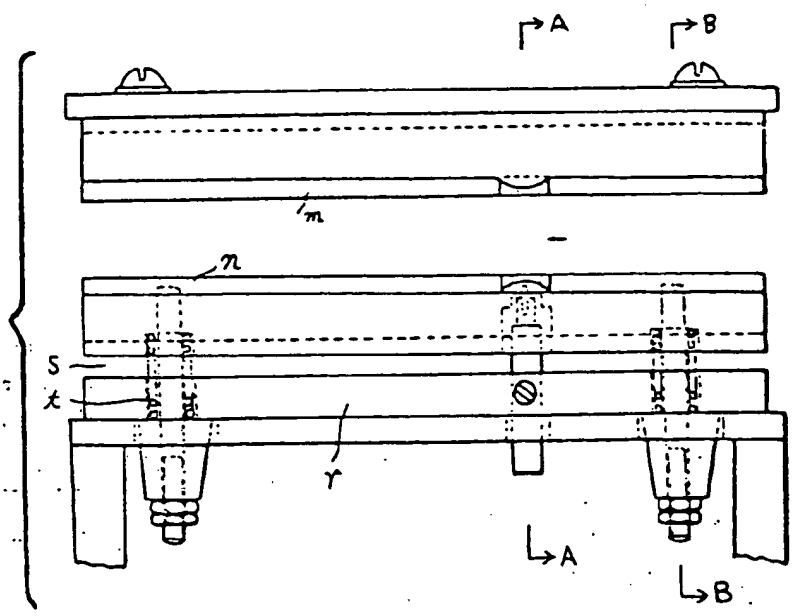


Fig. 18

Fig. 19



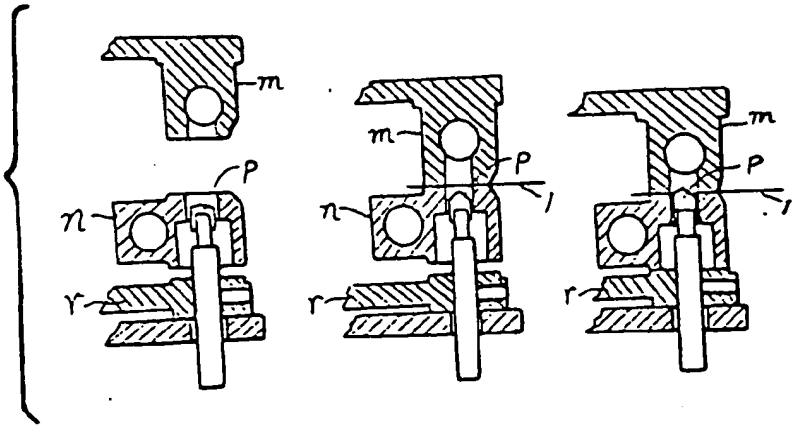


Fig. 20 Fig. 21 Fig. 22

Fig. 23

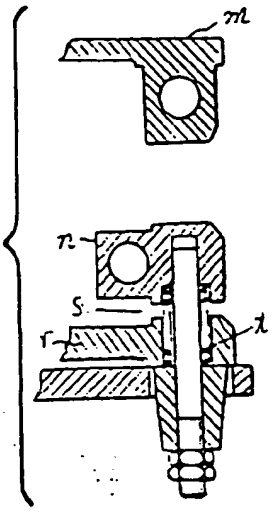


Fig. 24

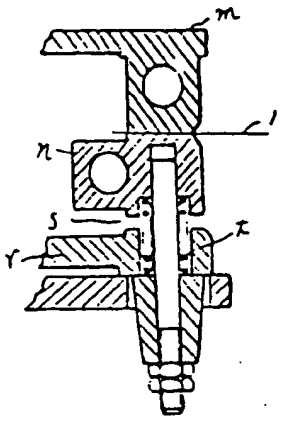


Fig. 25